



## DECLARATION

I, Ako Satoh, of Yanagida & Associates, 7F Shin-Yokohama KS Bldg., 3-18-3 Shin-Yokohama, Kohoku-ku, Yokohama-shi, Japan, hereby certify that I understand both English and Japanese, that the translation is true and correct, and that all statements are being made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Ako Satoh

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Dated this 3rd day of December, 2004

(Name of Documents)	Petition for Patent Application
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(Title of Invention)                      Magnetic Tape Cartridge

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(Name of Document) Abstract 1  
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[Name of Document] SPECIFICATION

[Title of Invention]

Magnetic Tape Cartridge

[Scope of Demand for Patent]

5       [Claim 1] A magnetic tape cartridge comprising: a cartridge case for rotatably housing a single reel with a magnetic tape wound thereon; and a leader pin which is affixed to the leading end of the magnetic tape and used for pulling out the magnetic tape,

10           wherein the leader pin has a tape clamp portion around which the magnetic tape is wound, and the leader pin is affixed to a leading end of said magnetic tape by elastically fitting a clamp member with a C-shaped cross section onto the tape clamp portion, the clamp member including an axially extending slit,  
15       and

          wherein a sheet member for enhancing a coefficient of friction is interposed at least between the magnetic tape and the tape clamp portion.

[Detailed Description of the Invention]

20           [0001]

[Technical Field of the Invention]

          The present invention relates to a magnetic tape cartridge, in which a single tape reel with magnetic tape wound thereon is rotatably housed within a cartridge case, and in  
25       which a leader pin for pulling the magnetic tape out of the cartridge case is affixed to the leading end of the magnetic tape. More particularly, the present invention relates to a structure in which the leader pin is affixed to the magnetic tape.

30           [0002]

[Description of the Related Art]

A conventional known type of magnetic cartridges that are used as storage media for an external storage unit such as a computer is that rotatably housing a single reel with a magnetic tape being wound thereon. This magnetic tape is employed to archive data for computers, etc. Since important information has been stored on the tape, the magnetic cartridge is constructed so that problems, such as tape jamming, etc., do not occur and that the magnetic tape is not pulled out of the cartridge case unexpectedly.

[0003]

A drive unit is configured such that a leader pin for pulling out the magnetic tape is affixed to the leading end portion of the magnetic tape, and this leader pin is held and pulled out by a hold member provided on a recording-reproducing apparatus side, whereby forward winding or reverse winding of the magnetic tape is performed. Uniting of the leader pin and the magnetic tape can be performed by winding the magnetic tape on the outer periphery of the tape clamp shaft portion of the leader pin and then elastically fitting a clamp member with a C-shaped cross section onto the tape clamp portion to clamp the leading end portion of the magnetic tape therebetween.

[0004]

[Problems to be Solved by the Invention]

In the structure in which the leader pin is affixed to the leading end of magnetic tape as described above, the coefficient of friction between the magnetic tape and the leader pin is low and therefore there is a possibility that because of insufficient clamping force, the leader pin will be disengaged from the magnetic tape.

[0005]

More specifically, in order to reduce the sliding friction between the magnetic tape and the magnetic head, there are cases where the addition of a lubricating agent to the

magnetic layer of the magnetic tape, or the coating of a lubricating agent on the top surface of the magnetic tape, is performed so that the coefficient of friction is reduced. The back surface of the magnetic tape is also treated in the same manner. In that case, the coefficient of friction between the leader pin, formed from stainless steel, etc., and the magnetic tape varies depending on the type of the magnetic tape. When this coefficient of friction is low, the clamping force of the magnetic tape with respect to the leader pin by the engagement of the clamp member onto the leader pin could be reduced.

[0006]

The present invention has been made in view of the points mentioned above. Accordingly, it is a primary object of the present invention to provide a magnetic tape cartridge that is capable of enhancing the clamping force of the magnetic tape with respect to the leader pin, thereby assuring reliability.

[0007]

#### [Means for Solving the Problems]

A magnetic tape cartridge of the present invention, which overcomes the foregoing problems, comprises: a cartridge case for rotatably housing a single reel with a magnetic tape wound thereon; and a leader pin which is affixed to the leading end of the magnetic tape and used for pulling out the magnetic tape; wherein the leader pin has a tape clamp portion around which the magnetic tape is wound, and the leader pin is affixed to a leading end of said magnetic tape by elastically fitting a clamp member with a C-shaped cross section onto the tape clamp portion, the clamp member including an axially extending slit, and wherein a sheet member for enhancing a coefficient of friction is interposed at least between the magnetic tape and the tape clamp portion.

[0008]

The sheet member may be stuck to the magnetic tape. This is preferable in terms of ease of the uniting operation of the

magnetic tape and the leader pin.

[0009]

In addition, the sheet member may be provided without being stuck to the magnetic tape. This is preferable in that  
5 when the magnetic tape is repeatedly bent near the leader pin, as the position at which the magnetic tape is clamped varies, durability is enhanced.

[0010]

The sheet member refers to flexible ribbon-like members,  
10 such as a plastic sheet made from polyester or the like, a plastic film, a foam sheet of elastomer, etc., a laminate film, a laminate paper or the like. The sheet member is selected so that the coefficient of friction between the surface of the sheet member and the leader pin becomes higher than that between the  
15 surface of the magnetic tape and the leader pin.

[0011]

[Advantageous effect of the Invention]

According to the invention as described above, the sheet member for enhancing a coefficient of friction is interposed  
20 at least between the magnetic tape and the tape clamp portion when the leader pin is affixed to the leading end portion of the magnetic tape by fitting the clamp member onto the leader pin. Therefore, even when the friction coefficient between the surface of the magnetic tape and the leader pin is low, the  
25 interposition of the sheet member enhances the friction coefficient between the sheet member and the leader pin and increases the clamping force of the magnetic tape with respect to the leader pin. As a result, disengagement of the leader pin from the magnetic tape can be prevented, whereby reliability  
30 can be assured.

[0012]

Furthermore, the interposition of the sheet member serves to reinforce the magnetic tape near the tape clamp portion of the leader pin when the leader pin is pulled out and in by a

drive unit.

[0013]

[Embodiments of the Invention]

The present invention will be described in detail in connection with an embodiment shown in the accompanying drawings. FIG. 1 is an exploded perspective view of a magnetic tape cartridge according to an embodiment of the present invention.

[0014]

The magnetic tape cartridge 1 has a cartridge case 4, which is formed by fastening an upper case 2 and a lower case 3 together with small screws, etc. Within the cartridge case 4, a single reel 7 with magnetic tape 6 wound thereon is rotatably housed. The magnetic tape 6 has a leader pin 5 affixed at the leading end thereof. An opening 10 for pulling out the magnetic tape 6 is formed in one side wall of each of the upper and lower cases 2 and 3. This opening 10 is opened and closed by a slide door 11 which is urged in a closing direction thereof by an elastic means (not shown).

[0015]

During non-use of the magnetic tape cartridge 1, the upper and lower ends of the leader pin 5 affixed to the leading end of the magnetic tape 6 are held in housing recesses 20 formed near the opening 10, with the magnetic tape 6 completely wound on the reel 7.

[0016]

The leader pin 5 is held and pulled in by a drive unit of a recording-reproducing apparatus, which uses the magnetic tape cartridge 1, so that the magnetic tape 6 is introduced into a tape traveling path within the recording-reproducing apparatus. A clamp member 55 to be described later (see FIGS. 2 and 3) is fitted on the leader pin 5 to clamp the magnetic tape 6 therebetween. Also, a lock member 9 consisting of a plate spring is installed to detachably hold the leader pin 5 in the



housing recesses 20.

[0017]

Referring to FIG. 1, the upper and lower cases 2, 3 are formed in a generally rectangular shape and provided with side walls 2b, 3b along the perimeter of the top wall 2a and the bottom wall 3a. The upper and lower cases 2, 3 are further provided with arc-shaped inner walls 3c (arc-shaped inner walls for the upper case 2 are not shown) along the outer periphery of the reel 7. The lower case 3 has four boss portions 3d (a boss portion 3d near the opening 10 is hidden behind the slide door 11) between the side walls 3b and the inner walls 3c. The lower case 3 is fastened to the upper case 2 by abutting the four boss portions 3d of the lower case 3 against the boss portions (not shown) of the upper case 2, and then tightening small screws through the bottom surface of the lower case 3.

[0018]

The center portion of the lower case 3 also has a center hole 3e so that the reel 7 can be driven by a driving shaft of the aforementioned drive unit. A write protector member 13 is slidably disposed in the rear end portion of the cartridge case 4. The center portion of the reel 7 is provided with a rotation regulating mechanism 15 for restricting rotation of the reel 7 during non-use of the magnetic tape cartridge.

[0019]

In addition to above, although not shown, the reel 7 includes a reel plate mounted on the central portion of the bottom surface thereof. The reel plate is used for attracting and holding a magnetic type rotary drive means. The radially outer portion of the bottom surface of the reel 7 has a reel gear that meshes with the driving gear of the rotary drive means. If the reel gear and the driving gear mesh with each other, the rotation regulating mechanism 15 performs an unlocking operation and frees the reel 7 to rotate.

[0020]

As illustrated in FIGS. 2 and 3, the leader pin 5 has a

tape clamp shaft portion 51 at its central portion. The leading end portion of the magnetic tape 6 is wound on the tape clamp portion 51 and is clamped by fitting a C-shaped cross-section clamp member 55 onto the tape clamp portion 51. The leader pin 5 also has upper and lower flange portions 52, 52 at the upper and lower ends of the tape clamp portion 51 and further has narrow engagement portions 53, 53 outside the upper and lower flange portions 52. The engagement portions 53, 53 extend axially and are engaged and held by the recording-reproducing apparatus. Furthermore, the leader pin has locking portions 54, 54 at the opposite ends thereof.

[0021]

The leader pin 5 is formed, for example, by cutting a shaft of metal such as stainless steel, etc., and the length of the tape clamp portion 51 is set so that it equals the width of the magnetic tape 6.

[0022]

The clamp member 55 is molded from resin and has an axial length equivalent to the length of the tape clamp portion 51 of the leader pin 5. The clamp member 55 is formed into a C-shape in cross section and provided with a slit 55a extending axially over the overall length. The clamp member 55 consists of an outer periphery 55b, an inner periphery 55c, and end faces 55d. The width of the aforementioned slit 55a is narrower than the outside diameter of the tape clamp portion 51 so that the clamp member 55 can be elastically fitted on the leader pin 5 while deforming the clamp member to open the slit 55a.

[0023]

As illustrated in FIGS. 3 and 4, a sheet member 8 for enhancing a coefficient of friction is interposed between the magnetic tape 6 and the tape clamp portion 51 when the leader pin 5 is affixed to the magnetic tape 6 by fitting the clamp member 55 onto the leader pin. This sheet member 8 is made of a material such as an adhesive sheet which has adhesive properties, and is stuck to one side of the magnetic tape 6.

With the clamp member 55 being fitted, the surface of the sheet member 8 contacts the surface of the tape clamp portion 51, and the exterior surface of the magnetic tape 6 contacts the inner periphery 55c of the clamp member 55.

5 [0024]

As the sheet member 8, a flexible ribbon-like member, which is made of a plastic sheet (polyester, etc.), a form sheet, a laminate film, a laminate paper or the like and which has an adhesive layer on one side thereof, is used. The sheet member  
10 8 is selected such that the coefficient of friction between the surface thereof and the leader pin 5 is higher than the coefficient of friction between the surface of the magnetic tape 6 and the leader pin 5.

[0025]

15 According to this particular embodiment, the leader pin 5 is affixed to the leading end portion of the magnetic tape 6, by fitting the clamp member 55 on the tape clamp portion 51 of the leader pin 5. Therefore, the friction coefficient between the sheet member 8 and the leader pin 5 becomes higher and the  
20 clamping force of the magnetic tape 6 is increased. The increased clamping force prevents the magnetic tape cartridge from being disabled due to disengagement of the leader pin 5 from the magnetic tape 6. In addition, since the sheet member 8 with adhesive property, for example, an adhesive tape, is  
25 stuck to the magnetic tape 6 beforehand, the leader pin 5 can be easily attached to the leading end portion of the magnetic tape 6.

[0026]

As a modification of this embodiment, the sheet member  
30 8 may have no adhesive property, although the details are not shown. That is, this sheet member 8 is interposed between the magnetic tape 6 and the leader pin 5 without being stuck to the magnetic tape 6. The friction coefficient of the sheet member 8 is high as in the foregoing embodiment. As a result, the  
35 clamping force of the magnetic tape 6 with respect to the leader

pin 5 is increased and prevents disengagement between the magnetic tape 6 and the leader pin 5.

[0027]

In the particular embodiment, there are cases where a hold  
5 block of the drive unit holding the leader pin 5, as it is, is  
fitted on a winding reel of the drive unit and driven to rotate.  
If, in that case, the magnetic tape 6 is repeatedly bent near  
the leader pin 5 at an acute angle, the magnetic tape 6 will  
be degraded at the bent portion and a problem of durability will  
10 arise. However, in the modification, the position at which the  
magnetic tape 6 clamps the leader pin 5 will shift slightly due  
to the sheet 8 being disposed in a non-adhesive manner and  
therefore a position at which the magnetic tape 6 is bent will  
change. Thus, the magnetic tape is prevented from being bent  
15 at the same position and is enhanced in durability.

[0028]

While, in the embodiment, the sheet member 8 is interposed  
between the magnetic tape 6 and the outer periphery of the leader  
pin 5, in addition to this, another sheet member may be  
20 interposed between the magnetic tape 6 and the inner periphery  
55c of the clamp member 55.

[0029]

In addition, the clamp member 55 is not limited to a  
resin-molded product, but may be molded from other materials  
25 such as a thin metal plate, etc.

[Brief Description of the Drawings]

[FIG. 1]

FIG. 1 is a schematic exploded perspective view of a  
magnetic tape cartridge according to an embodiment of the  
30 present invention.

[FIG. 2]

FIG. 2 is a perspective view showing the state in which  
the clamp member is fitted on the leader pin of FIG. 1.

[FIG. 3]

FIG. 3 is a perspective view showing the state before the leading end of the magnetic tape of and the leader pin are joined together.

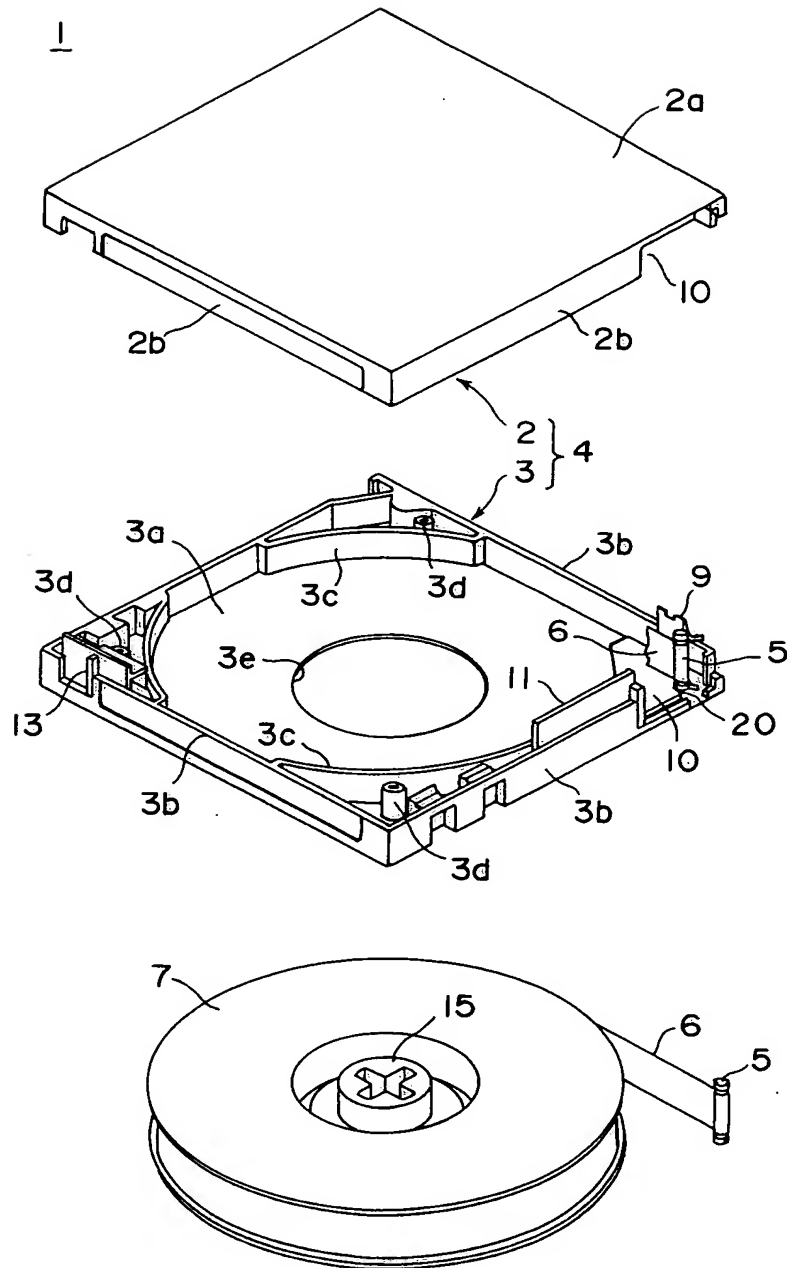
5 [FIG. 4]

FIG. 4 is a cross sectional view showing the state in which the magnetic tape and the leader pin are joined together.

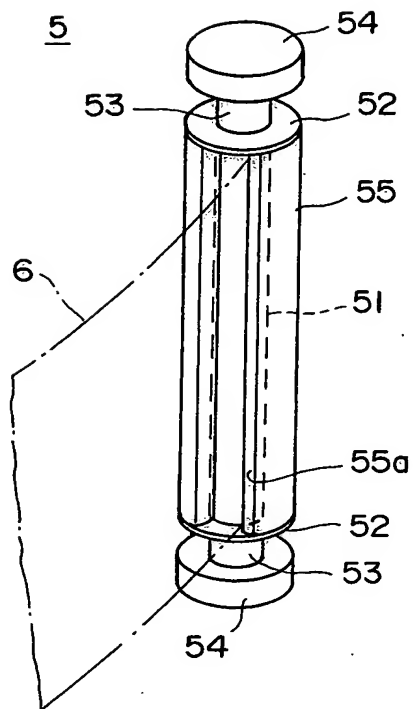
[Explanation of the Reference Numerals]

- 1: magnetic tape cartridge
- 10 2: upper case
- 3: lower case
- 4: cartridge case
- 5: leader pin
- 6: magnetic tape
- 15 7: reel
- 8: sheet member
- 9: lock member
- 10: opening
- 20: housing recess
- 20 51: tape clamp portion
- 52: flange portion
- 53: engagement portion
- 54: locking portion
- 55: clamp member
- 25 55a: slit

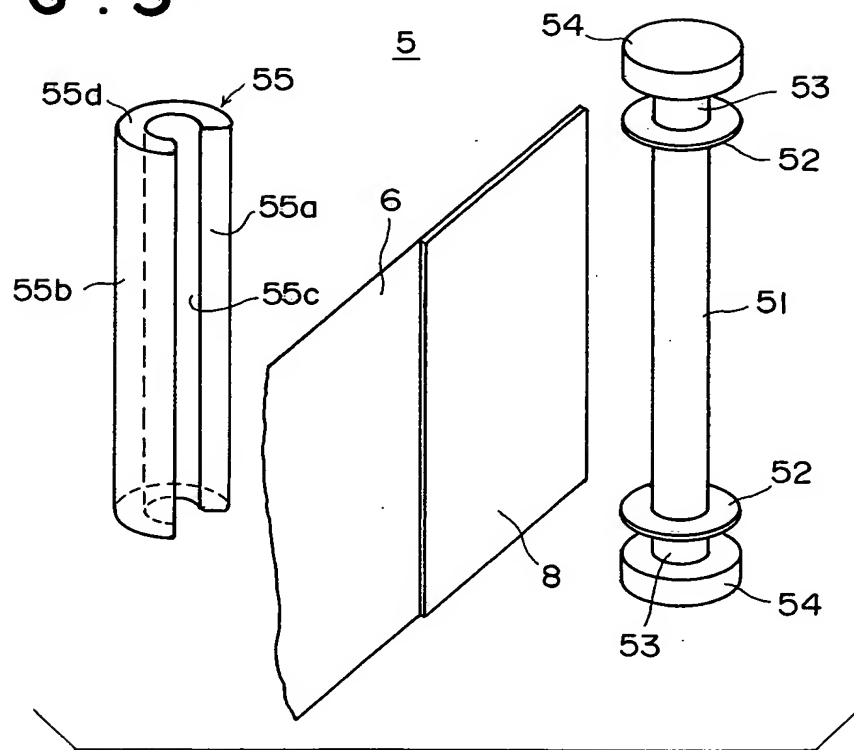
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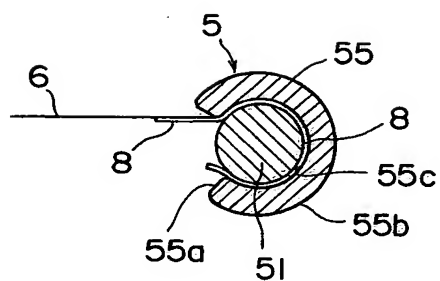


**FIG. 2**



**FIG. 3**





**F I G . 4**



[Name of Document]

ABSTRACT

[Abstract]

[Objective] To enhance the clamping force of a magnetic tape with respect to a leader pin, thereby assuring reliability of a magnetic tape cartridge.

[Constitution] A magnetic tape cartridge has a cartridge case 4 for rotatably housing a single reel 7 with a magnetic tape 6 being wound thereon. A leader pin 5 for pulling out the magnetic tape 6 is affixed to the leading end of the magnetic tape 6 by elastically fitting the clamp member 55 with a C-shaped cross-section. A sheet member 8 for enhancing a coefficient of friction with the leader pin 5 is interposed at least between the magnetic tape 6 and the tape clamp portion 51.

[Selected Figure] FIG. 1